

Abstract Submitted
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Quasi-static Modeling of Plasma Wake Field Acceleration of Electron/Positron Beams MIAOMIAO ZHOU, CHENGKUN HUANG, WEI LU, FRANK TSUNG, VIKTOR DECYK, UCLA, ADRIAN DOWN, UC Berkeley, CHAN JOSHI, WARREN MORI, UCLA, E-167 COLLABORATION — A quasi-static particle in cell code QuickPIC is used to model Plasma Wake Field Acceleration (PWFA) by a relativistic electron or positron beam. Field-ionization, synchrotron radiation effects are included in the model. For an electron beam driver, the parameters in recent afterburner relevant experiments (E167) are used. Head erosion turns out to be a key factor limiting further energy gain for these parameters. The erosion speed in the simulation are compared with a simple theoretical calculation. The final energy spectrum measured in the experiment agreed very well with simulation predictions. For a positron beam driver, beam parameters relevant to the future SABER facilities are considered. Simulations show a pattern of positron beam evolution, i.e. a rapid modulation followed by an envelope stabilization. Up to 5.7 GeV energy gain were observed within 39 centimeters of plasma. At the end, a method of including the trapped particles into the quasi-static model will be described. Preliminary results will be shown.

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